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# Indo-Soviet Agreement on Scientific Projects

An Indo-Soviet Agreement for collaboration on three scientific projects was signed by Dr Atma Ram, Director General, Scientific & Industrial Research, and President, National Institute of Sciences of India and Academician A. P. Vinogradov, Vice-President, USSR Academy of Sciences in the CSIR secretariat, New Delhi on 27 Feb. 1970. According to the agreement the following projects, for which detailed reports have been prepared by the panels, would be implemented on institute-to-institute basis: (1) Studies in geomagnetic and geoelectric micropulsations in India; (2) Cultivation and processing of medicinal and aromatic plants; and (3) Science information centre.

The project for studies in geomagnetic and geoelectrical micropulsations will be implemented by the National Geophysical Research Institute, Hyderabad; Indian School of Mines, Dhanbad; and the India Meteorological Department, New Delhi in collaboration with the Institute of Physics of the Earth, Moscow. It is planned to start a comprehensive study of the electrical behaviour of the crust and upper mantle under the tectonic zones in the Indian sub-continent. For this purpose a station will be set up in the close vicinity of the magnetic dip equator in the extreme south of India to make continuous recording of micropulsations. The Soviet Academy of Sciences will provide specialized scientific equipment for these studies, and two scientists to instal and test the equipment. Three Indian scientists will be trained at the Moscow Institute of Physics of the Earth in techniques and methodology of measuring micropulsations.

Medicinal and aromatic plants constitute important raw materials for the essential oil and pharmaceutical industries. But the raw material wealth has not been fully utilized. Considerable research work has been carried out in the Soviet Union on the cultivation and processing of medicinal and aromatic plants. The project envisages collaboration between Indian and Soviet research institutes in this field for culture of medicinal and aromatic plants and introduction of new species in India and processing the plant material for medicinal and industrial use. The Central Drug Research Institute, Lucknow; the Regional Research Laboratory, Jammu; and the National Botanic Gardens, Lucknow will collaborate with Villar, Moscow; Institute of Chemistry of Natural Products, Tashkent; and the Institute of Chemistry of Natural Products, Moscow. Two Soviet scientists will work at the Regional Research Laboratory, Jammu and at the Central Drug Research Institute, Lucknow.

Academician A. P. Vinogradov, Vice-President, USSR Academy of Sciences and Dr Atma Ram, Director General, Scientific & Industrial Research signing the Indo-Soviet Agreement on Scientific Projects in CSIR, New Delhi on 27 Feb. 1970

Two Indian scientists will visit USSR; one will work at the Institute of Chemistry of Natural Products, Tashkent and the other at the Institute of Chemistry of Natural Products, Moscow. The detailed programme will be worked out by the teams of Indian and Soviet scientists.

To facilitate a free flow of scientific literature to India from the Soviet Union, a project has been formulated for setting up a Science Information Centre at Insdoc, New Delhi. The USSR Academy of Sciences will assist Insdoc in this regard and will supply a wide range of Soviet scientific journals, monographs, books and other publications on continuing basis. The Academy will also send an experienced information scientist to assist Insdoc for a period of two years. It will also train two Indian scientists in USSR in this field.

Similar projects in other scientific fields, which have been identified by the joint committee, will be elaborated and implemented on a collaborative basis by India and USSR.

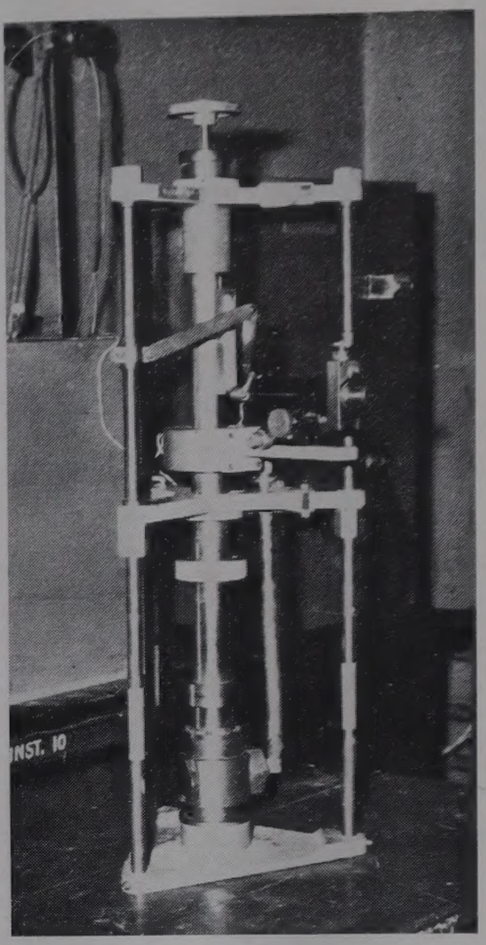
Following the visit of a delegation of Indian scientists to USSR in May 1967 and the discussions held between Indian and Soviet scientists, the Government of India and USSR Academy of Sciences agreed to set up, on a permanent basis, a joint committee of scientists of both countries to collaborate in scientific research. The Indian committee was headed by Dr Atma Ram and the Soviet committee by Academician A. P. Vinogradov, Vice-President, USSR Academy of Sciences. The first meeting of the joint committee was held in New Delhi from 31 Jan. to 6 Feb. 1968. It identified the following disciplines for research cooperation between India and USSR: (1) mathematics, physics, astrophysics and nuclear physics; (2) earth sciences; (3) oceanography; (4) chemistry and biological sciences; (5) social sciences; and (6) science information. Following the recommendations of the joint committee, panels of Indian experts were set up by the National Institute of Sciences of India to prepare detailed project reports in these fields for collaboration between the two countries.

# New Instruments Developed

### Precision Ultrasonic Interferometer

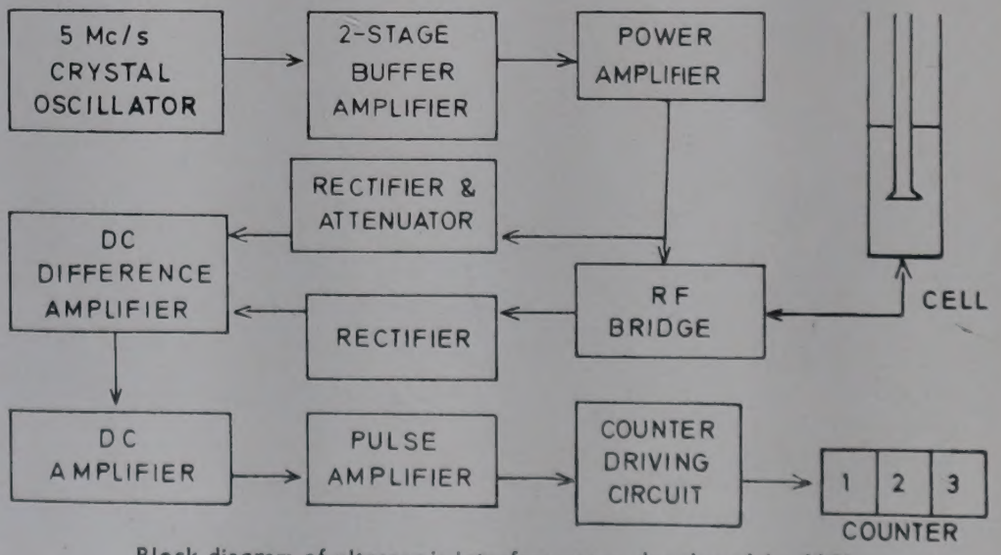
A precision ultrasonic interferometer has been designed and developed by the National Chemical Laboratory (NCL), Poona for velocity measurements in solutions and liquids so as to determine the adiabatic compressibility and other related thermodynamic data. The basic principle consists in setting up a standing wave in a cell between a crystal and a reflector with some provision for changing and measuring its position with respect to the wavelength. The sound waves emanating from the crystal are reflected back from a reflecting surface and when it is 180°out of phase, the disturbance at the crystal is essentially reduced to zero. This produces a considerable change in impedance of the circuit in which the crystal is incorporated. This situation will arise every time as the reflector moved a half wavelength distance.

The liquid for measurements is contained in a cylindrical stainless steel cell (Sandvik 10RE21), and a plane reflector is moved up and down, without rotation, by means of a lead screw until a standing wave is set up. Its position is determined within an accuracy of $\pm 1\mu$. The electronic circuit uses a RF bridge consisting of three matched 52 ohm resistors and the fourth arm is the cell itself. A motion of the reflector in the cell changes the impedance of this arm and the off-balanced signal is compared with a rectified and attenuated bridge input signal in a balanced dc amplifier.



Interferometer cell

The characteristics of the ultrasonic interferometer are as follows: frequency, 5 Mc/s, accuracy of readings—wavelength; $\pm 1\mu$ & frequency, $\pm 0.001\%$ (10 ppm) depending on the crystal used. The tubes used are: 6AU6, 2X6AK5, 2X12A X7, 12AU7, 2E26, 12BH7, 6SJ7, 5U4, 6Y6/6AS7, 6X5, OB2 and 2X



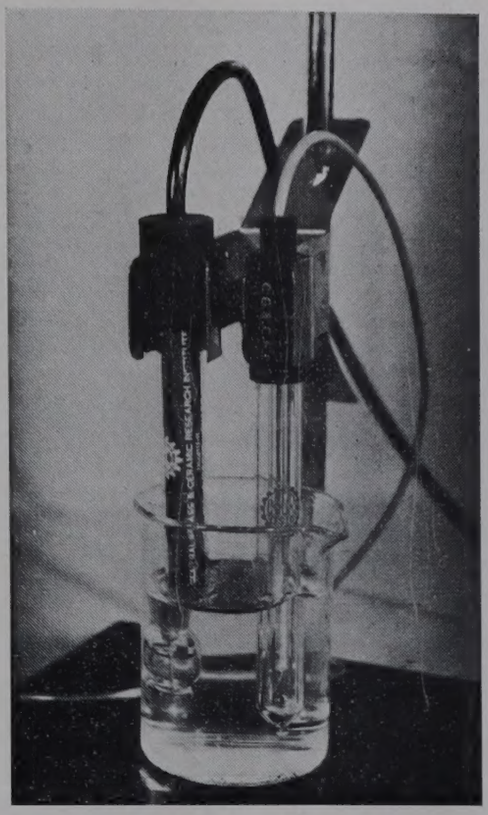

Block diagram of ultrasonic interferometer developed by NCL

IN60. The special parts used in the instrument are AS17161 micrometer eyepiece, 100 mm scale with 0.1 mm rulings, 5 Mc crystal quartz transducer (4.3 cm diam.) and X-cut quartz crystal. The imported components are mercury dc magnetic counter and stainless steel (Sandvik 10RE21) 2E26 tube, which roughly cost Rs 1500.

**Development of Ion Electrodes**

The Central Glass & Ceramic Research Institute, Calcutta has developed ion electrodes made of glass which will provide industry and analytical laboratories with a simple and economic tool for rapid and accurate estimation of alkali ions in solution. The present methods, with the exception of flame photometric method, are tedious and time-consuming. Flame photometry involves the use of sophisticated and mostly imported equipment.

Two glass compositions having high $Na^+$ ion selectivity (between 1 and 3.4 pNa range) have been developed and found to be suitable for making sodium ion electrodes. The effect of common interfering ions, except $Al^{3+}$ and $Fe^{3+}$ has been found to be insignificant up to a certain concentration. The influences of $Al^{3+}$ and $Fe^{3+}$ ions can be effectively suppressed by the addition of an organic chemical to the test solution. A comparative study carried out on a large number of silicate samples showed a standard deviation of less than 2% when compared to the flame photometric method.



$Na^+$ ion electrode developed by CGCRI for rapid and accurate estimation of sodium [assembly of $Na^+$ ion electrode (left); calomel reference electrode (right)]

The $Na^+$ ion electrodes will be of considerable use to industry in analytical work and the development will also provide an impetus to the newly established indigenous pH meter manufacturing industry. The work has since been extended to the development of $K^+$ ion electrodes.

# Photometric Standards for Research and Industry : Facilities at NPL

S. R. Das & K. S. Sarma

National Physical Laboratory, New Delhi

In the early stages of standardization of intensities of light sources, frame lamps burning suitable vapours at a fixed rate under definite ambient conditions had served as standards of luminous intensity. Because of the inherent difficulties associated with the exact reproduction of the ambient conditions, the flame standards were replaced later in the early part of this century by incandescent filament standards. The high stability of tungsten filament lamps makes it convenient to have intercomparison of the units between different national standards laboratories. However, it could at best be an ad hoc standard, as the method of standardization is not based on any fundamental physical property. But a planckian radiator has the qualification of serving as a primary standard, as the radiant emittance is determined only by its temperature, a fundamental physical property.

**Primary standard**

The present internationally accepted primary standard adopted in 1948 is the full radiator, also called 'blackbody', operating at the freezing point of molten platinum (2042°K). The basic photometric unit is that of a luminous intensity and is a 'candela', which is 1/60th of the luminous intensity per square centimetre of the radiating surface of this blackbody. The unit for the luminous flux, viz. a lumen is also derived from the 'candela'. Owing to many difficulties involved in the regular maintenance of the blackbody radiator, it is the practice of laboratories to set up photometric secondary standards for luminous intensity and luminous flux using a selected group of incandescent filament lamps. Since these are maintained at definite colour temperatures, i.e. the temperature of the full radiator (in °K) at which the full radiator has a colour identical with that of the test source, a colour temperature scale through a group of incandescent lamps is also maintained.

**Secondary standards**

Following an international agreement in 1948, the standard unit of light is established by intercomparing the secondary standards maintained by the various national laboratories with the primary standard at the International Bureau of Weights & Measures in Paris. All these secondary standards are in turn compared with the primary standards maintained individually at the different national laboratories. The secondary standards fall into four categories: (1) those of luminous intensity at the colour temperature of the primary standard, viz. 2042°K; (2) those of luminous intensity at 2353°K; (3) those of luminous flux at 2353°K; and (4) those of luminous flux at 2788°K. The secondary standards are specially made incandescent lamps of carbon and tungsten filaments which act as 'grey body' sources in the visible region. The colour temperature standards are: (1) vacuum lamps (100V, 60W) with squirrel cage type tungsten filaments, used for colour temperatures less than 2400°K, and (2) gas-filled projector type singly coiled tungsten filament lamps (100V, 500W) for colour temperatures above2400°K.

**National standards**

The laboratory maintains the intensity and flux standards received

from the International Bureau of Weights & Measures, to serve as the national standards. Besides, lamps have been obtained from the National Bureau of Standards, USA and the National Physical Laboratory, UK for developing from them the laboratory standards. Lamps which are to serve as laboratory standards will have to be of special construction and have to undergo ageing by sufficient pre-heating before they can be used. Since, such lamps are not at present made in the country, difficulty is experienced in meeting the full demands for such standards from universities, test houses, laboratories and industries. However, with a view to filling the need, NPL has been supplying working standards instead of the laboratory standards, to these institutions. The photometric laboratory is fully equipped for calibration of these working standards to ensure laboratory standard accuracy.

There has been recently demand from the industries for a working standard for fluorescent lamps. While the calibration of fluorescent lamps is being undertaken in the laboratory, it may take a little more time for the laboratory to be in a position to supply working standards for fluorescent lamps. This demand is of very recent origin and NPL scientists are giving their attention to it. The laboratory expects to meet the industry's demand in this respect also.

### Colour temperatures

Reference standards for radiation distribution are also maintained through a set of incandescent lamps (colour temperature standards) obtained from the National Physical Laboratory, Teddington. One can use radiation from such a lamp as having the planckian form of energy distribution for a given temperature. This is possible because of the principle that planckian radiator emits an energy distribution which is a function of temperature only. The laboratory has been supplying to universities and research institutions lamps calibrated for specific colour temperatures within the range for which there is a reference in NPL. At times, when there has been demand for calibration of relative spectral sensitivity of radiation receivers like photocells or photomultipliers, these reference sources have been used in combination with narrow band filters of measured transmission.

Of late, there has been demand for radiation distribution of light sources other than incandescent sources. For instance, a fluorescent lamp or a vapour discharge lamp has peculiar distribution which is a combination of continuum with line radiations a few of which may be very prominent. Against the laboratory's reference lamps, these special sources have been measured for radiation distribution.

## Composition of Tar Acids from LTC of Coal

As part of a research programme on utilization of byproducts from low temperature carbonization (l.t.c) of noncaking coals, studies were made at the Regional Research Laboratory, Hyderabad on the composition of tar acids (phenolic bodies) present in l.t.c. tar and aqueous liquor, obtained during the l.t.c. of a meta lignitous coal from Andhra Pradesh in a Lurgi-spuel gas retort. No detailed examination of l.t. tars in general and l.t. tars from internally heated carbonizers like Lurgi-spuel gas, in particular, has been reported so far.

The tar acids from both tar and aqueous liquor were isolated and studied for their detailed composition by fractional distillation and solvent fractionation followed by paper and gas chromatographic investigations.

Paper chromatographic separation of the mono-hydric phenols as their azo-dyes was shown to be effective for the separation of isomeric phenols. A simple method for making the azo-dye *in situ* on the filter paper was worked out. The Rf values of 31 mono-hydric phenols as their axo-dyes were determined and correlated with their structure. Gas chromatography was mainly used for the quantitative estimation. Data on retention time with three new stationary phases for phenols were recorded.

Sixty-two phenols boiling up to 290°C have been identified and their quantitative compositions determined. Out of these, 11 ph enolsmostly belonging to methyl 4- and 5-indanols have been identified for the first time. The quantitative composition of the phenols identified shows that commercially important phenols in the lower boiling range (up to 232°C) are present in appreciable quantities in the tar investigated.

A comparative study of the composition of tar acids according to rings structure and carbon number (studied in the present investigation) with that of two other l.t. tars suggested the nature of the present l.t. tar to be intermediate in its characteristics between that of a fluidized bed l.t. tar (more primary) and an externally heated l.t. tar (secondary decomposition).

The yields (in kg) of commercially useful lower phenols worked out from 100 tonnes of coal are as follows: phenol, 104; *o*-cresol, 62; *m*-/*p*-cresols,109; 2,5/2,4-dimethylphenols, 61; 2,3/3,5-dimethyl phenols, 98; and 3-methyl-5-ethyl/2,3,5-trimethylphenols, 37.

The research was carried out by Shri Y. V. Subba Rao, RRL, Hyderabad under the guidance of Dr M. G. Krishna, Director, IIP, Dehra Dun. Shri Subba Rao was awarded the Ph.D. degree by the Osmania University in 1969 for his thesis: 'Studies on the composition of tar acids from low temperature carbonization of coal'.

## Studies on Fatty Acids and their Esters

Ethylene glycol mono-esters of palmitic, stearic, arachidic, oleic, petroselinic, elaidic, stearolic, erucic and hydnocarpic acids were prepared in 80-90% yield by a simple procedure at the Regional Research Laboratory, Hyderabad. The process consisted in reacting fatty acid with tri (2-hydroxyethyl) orthoborate, obtained by heating ethylene glycol and boric acid, and hydrolysing the complex with warm water to yield the mono-ester. The ethylene glycol mixed diesters were prepared by addition of either oleoyl, stearoyl, elaidoyl or caproyl chloride to an ethanol-free chloroform solution of the appropriate ethylene glycol mono-ester in the presence of pyridine. The esters were purified by crystallization and chromatographic techniques. The mixed diesters were hydrolysed

with pancreatic lipase and the compositions of the liberated fatty acids, mono-esters and the original esters were determined. Lauric, palmitic, stearic, oleic, elaidic, stearolic and hydnocarpic acids were hydrolysed with equal ease. Caproic acid was hydrolysed faster than stearic acid. Arachidic and erucic acids were hydrolysed slower than oleic acid.

The glyceride structures of *Shorea robusta*, *Carica papaya*, *Argemone mexicana*, *Hydnocarpus wightiana* and *Sapindus trifoliatus* seed fats were determined by a semi-micro pancreatic lipase hydrolysis technique. The glyceride compositions according to various theories were calculated using an IBM 1620 digital computer. Small amounts of epoxy, keto and hydroxy fatty acids were found in *A. mexicana* seed oil.

Thin-layer chromatographic techniques were developed to detect (1) castor oil and mineral oil used as adulterants in vegetable oils, and (2) adulteration of coconut oil in the other vegetable oils.

The research was carried out by Shri V. V. S. Mani, Regional Research Laboratory, Hyderabad for his thesis entitled 'Studies on fatty acids and their esters' on the basis of which he was awarded the Ph.D. degree by the University of Kerala in December 1969. The research work was conducted under the guidance of Drs K. T. Achaya and G. Lakshminarayana of the laboratory.

## NGRI Annual Report 1968-69

Development of airborne geophysical survey facilities with indigenous equipment and know-how for prospecting mineral resources and groundwater was a major achievement of the National Geophysical Research Institute (NGRI), Hyderabad as revealed in its annual report for 1968-69 which has just been published.

The institute conducted aeromagnetic surveys in some potential mineral areas of Madhya Pradesh. Some anomalies were delineated and further confirmed by ground survey in the marked areas. The geophysical prospecting division of the institute carried out exploratory surveys using latest geophysical appliances and interpretation techniques. Geophysical studies at high altitudes in Pugga Valley, Ladakh may lead to successful tapping of hot groundwater which has domestic and industrial use in the region.

The studies in the gravity division of the institute have thrown light on the evolution and tectonics of the Indian sub-continent. The findings are important in understanding the origin of the orogenic belts in India including the Himalayas, the Aravallis and the Eastern Ghats. Geothermal studies indicate that regions having suffered repeated metamorphic activity have relatively higher heat flow values.

Latest geophysical data on the continental shelf off the Indian west coast suggest the continuation of the Chagos Islands northward under the sea up to Kori High forming an arcuate ridge feature in the Arabian Sea. This has been supported by the NW-SE trend in the iso-gamma map prepared after the first marine magnetic survey undertaken by the institute in the Arabian Sea to study the continent-ocean boundaries, topography and geological structures on sea floor.

Three observatories, geomagnetic, geoelectric and seismological, were in operation for collection of data for correlation and exchange.

It has been found that lateral surface-wave velocity gradients, investigated for the first time on a global scale, have a correlation with seismicity. The observation is supported by the fact that during the last 50 years all earthquakes of magnitude 8.5 and above occurred in regions having gradients of $1.5 \times 10^{-3}$/sec and above. This observation may lead to a different approach for solving some basic seismological problems, e.g. earthquake prediction. Detailed analysis of the data from both shallow and deep earthquakes have led to the development of statistical methods for finding the upper mantle velocity structure. One of the methods has application in retraction seismology for oil exploration.

Important fundamental investigations were carried out in the fields of electromagnetism, seismology, gravity, paleomagnetism and geothermics. The phenomenon of negative screening in electromagnetism was tested for its geometrical independence. The depth to the conductivity discontinuity in the earth's mantle was estimated using perturbation techniques. The theoretical investigations on the response of inhomogeneous sphere to electromagnetic transients is useful in airborne electromagnetic survey interpretations.

Fifty research papers were published during the year. Eight technical reports were prepared and submitted to the sponsors.

The batch production unit of the institute produced the following geophysical instruments: resistivity meters, proton magnetometers, seismic timers, E. M. unit and geophones. The sale proceeds of these during 1968-69 totalled Rs 1 23 065.

# CSIR SUPPORT TO RESEARCH

## New Schemes

### Effect of Disturbances on Laminar Pipe Flow

In the problem of determining the energy loss due to disturbances in pipe flow at present only empirical results are available on the loss coefficients for turbulent flow for a variety of pipe fittings. But such information in the case of laminar flow is scanty. Since laminar flow often occurs in oil transport and fluid power systems with oil as the medium, it is necessary to have a reliable estimate of the excess pressure loss due to fittings.

With this objective in view a new scheme entitled 'Effect of disturbances and fittings on laminar pipe flow' was started under purview of the Civil Engineering & Hydraulics Research Committee. The study, entrusted to Prof. N. S. Lakshmana Rao, Hydraulics Laboratory, Indian Institute of Science, Bangalore deals with the nature of modification of pressure and velocity fields due to disturbance introduced in laminar flow, such as concentric and eccentric orifices, perforated plates, screens, valves and other pipe fittings.

The flow development downstream of a disturbance is more complicated

than entrance flow because of the existence of separation and possibility of turbulent flow in the immediate vicinity of a disturbance. In the latter case, while the pipe Reynolds number may be in the laminar range, the disturbance may constrict the flow to such a degree that the local Reynolds number may exceed the critical value. In such a case the flow transforms itself from the turbulent state to the laminar state at places well downstream of the disturbance. This inverse transition is a subject of recent basic research.

Besides being of immediate engineering utility, the investigation has great scope for basic studies.

## Completed Schemes

### EPR Spectroscopy of Paramagnetic Ions

A CSIR scheme entitled 'Electron paramagnetic resonance (EPR) studies of transition metal ions doped in single crystals' was completed at the Department of Physics, Indian Institute of Technology, Kanpur. The research was carried out by Shri R. Janakiraman, research fellow, under the guidance of Dr G. C. Upreti of the department.

EPR studies were made on the effect of ligands of host lattice on the doped ion $Mn^{2+}$ in the lattices of zinc acetate dihydrate [$Zn(CH_3COO)_2.2H_2O$], ferrous ammonium sulphate hexahydrate [$Fe(NH_4)_2(SO_4)_2.6H_2O$] and nickel acetate tetrahydrate [$Ni(CH_3COO)_2 4H_2O$]. Zinc acetate dihydrate is tetramolecular, and the EPR of $Mn^{2+}$ in this lattice showed that the four $Zn^{2+}$ ions in the unit cell are magnetically equivalent. Besides, forbidden nuclear transitions ($\triangle M = \pm 2, \triangle m = \pm 1$) were observed and analysed. The primary interest in the EPR study was to observe the effect of paramagnetic host ions on the EPR of $Mn^{2+}$. For this purpose, $Fe(NH_4)_2(SO_4)_2.6H_2O$ and $Ni(CH_3COO)_2.4H_2O$ were taken up. $Fe^{2+}$ in $Fe(NH_4)_2(SO_4)_2.6H_2O$ exhibits EPR at 20°K and $Ni^{2+}$ is known to exhibit EPR at 300°K in some cases. In the present case, the splitting between the ground state triplet of $Ni^{2+}$ in nickel acetate tetrahydrate is much larger than the applied microwave field and hence the EPR of $Mn^{2+}$ was observed very distinctly throughout the temperature range, 77°-300°K. In $Fe(NH_4)_2 6H_2O$, no observable effect of $Fe^{2+}$ on $Mn^{2+}$ was detected up to the lowest available temperature, 77°K. In $Ni(CH_3COO)_2.4H_2O$ a steady increase in the linewidth of $Mn^{2+}$ resonance lines with static magnetic field was observed. This may be due to the dependence of the spin-spin and spin-lattice relaxation times, and hence the linewidth, on the frequency distribution of the $Ni^{2+}$ spin fluctuation in the case where the spin degeneracy is completely removed [as for $Ni^{2+}$ in $Ni(CH_3COO)_2.4H_2O$].

In all the systems studied the spectra were analysed by the spin-Hamiltonian formalism and the spin-Hamiltonian constants were calculated. In the case of $Mn^{2+}$ in $Fe(NH_4)_2(SO_4)_2.6H_2O$, comparing the spin-Hamiltonian constants and the angle between the axes with the EPR studies in similar lattices, possible ligand configuration of the six water molecules around the $Fe^{2+}$ ion was predicted.

## Wool Technological Conference

An all India seminar on 'Indian Wool' was held under the auspices of the Wool Research Association (WRA), Bombay in March 1968, when papers on sheep breeding, wool grading, marketing, mechanical processing, quality control, fibre properties and canary staining were presented. As a follow-up activity the first all India Wool Technological Conference was organized by WRA in Bombay on 19 and 20 Jan. 1970. It was inaugurated by Prof. C. S. Whewell, Head of the Textile Department, University of Leeds.

Fifteen papers were contributed in eight technical sessions by research workers from UK, Germany and India. Among the topics covered were: finishing of wool fabrics, milling shrinkage of wool fabrics, dyeing of woollen carpet yarns, processes for control of felting shrinkage of wool, wool sorting, woolcombing oils and ortho- and paracortex of merino wool.

C. S. Whewell, Textile Department, University of Leeds, in his paper discussed the criteria of permanent finishing of wool fabrics, namely dimensional stability and retention of surface appearance adopted in assessing and permanence of finish as well as the methods for improving dimensional stability, e.g. London shrinkage and autoclave setting and those for retention of surface appearance like non-shrink finish and lustring. Permanent chemical finishes, such as mothproofing, bleaching, felting and raising for enhancing usefulness of wool fabrics, were also described.

The causes of felting as also the methods of measuring felting of wool and the limitations of assessing the shrink-resistance of nonfelted wools by conventional methods were dealt with in a paper titled 'Studies in the longitudinal yarn felting shrinkage of wool' by A. D. Sule (WRA, Bombay) and S. R. Ranganathan (University of Glasgow). An apparatus for longitudinal felting of hand-knitting and hosiery wool yarns under different severity of shrinkage has been devised. The longitudinal felting shrinkage values of a variety of woollen and worsted yarns were also reported.

During dyeing of polyester fibre/wool blends differential shrinkage of polyester material plays an important role. Problems connected with this phenomenon and possible solutions were discussed by W. Birke (Farbwerke Hoechst, Germany) in his paper entitled 'Dyeing of polyester/wool blends'. The paper also dealt with a description of two-bath dyeing method for yarns, and the possibility of dyeing polyester/wool blended piece goods.

Kanti Kothawala (International Wool Secretariat, Bombay) described some of the commercially available shrink-resist processes. Reference was made to the DCCA process which is used in wool textile mills the world over and for which no royalty is charged. One of the most recent of shrink-resist processes, namely polymerization/kymene process, was reviewed.

The paper on 'Studies in the scouring of raw wools' by V. N. Jedka (Raymond Woollen Mills, Bombay), A. D. Sule and V. S. Kenkare (WRA, Bombay) dealt with scouring of raw wool in bulk on a four-bowl scouring machine using different conditions of scouring. Reported in the paper are the effect of various types of nonionic and

anionic detergents at different pH values and temperatures, and the build-up of wool wax in the first and second bowls and damage to the fibre as a result of alkali and heat over a period of 24 hr. Neutral scouring of raw wool with nonionic detergents was found to be most efficient and least damaging to the fibre.

N. P. Badve (WRA, Bombay) in his paper 'Scope of utilizing polypropylene blends in the Indian wool textile industry' gave the history of development of polypropylene fibre for textile use along with the salient characteristics of the commercially available fibres. Reference was made to the work done in the Wool Research Association on blends of polypropylene with wool. The scope for manufacturing polypropylene fibres in India and the utilization of this fibre in the wool textile industry were dealt with.

In 'Woolcombing oils' by P. T. Banerjee (Woolcombers of India Ltd, Calcutta) were given the functions of combing oils vis-a-vis specific requirements. The oils normally available for the industry and the various methods of testing of the suitability of the oils were reported. The problems of using indigenously available oils for wool combing were also discussed.

## PROCESSES READY FOR COMMERCIAL UTILIZATION

### Syntan PKR

India is rich in vegetable tanning materials, but not all of them are useful as self-tanning material. One such material is myrobalan produced to the tune of 78 000 tonnes per annum. Myrobalan is not useful as a self-tanning material because of its tendency to get hydrolysed with the formation of sludge giving spongy leather. Sludge formation can be prevented by treatment with suitable synthetic tanning materials, at one stage or other, either in the process of manufacture of extracts or during tanning operation.

With this object in view the Central Leather Research Institute, Madras has developed a synthetic tanning material known as Syntan PKR. The product is based on indigenous raw material. When used along with vegetable tanning materials, like myrobalan, it helps in the prevention of sludge and in attaining quicker penetration. It can also be used in the manufacture of light leathers and sole leathers.

The current annual requirement of Syntan PKR is estimated at 1000 tonnes.

The process has been worked out on a pilot plant scale and the economics has also been studied. The product obtained by modifying the myrobalan with this Syntan has been used by tanners and has been found suitable for the manufacture of different types of leathers, especially sole leather.

Glass-lined vessel and stainless steel storage vessels are the main items of plant and equipment needed in the process. All are available in the country. As an alternative to the glass-lined vessel, lead-lined vessel can be used.

The total capital outlay for setting up a plant capable of producing 375 tonnes of Syntan PKR per annum has been estimated at Rs 4.22 lakhs. Syntan PKR in liquid form (70% solids) will cost Rs 2000/tonne.

The process can be taken up with advantage by firms already engaged in the manufacture of synthetic tanning materials and vegetable tanning extracts.

### Heat Flow Transducer

A heat flow transducer is needed for heat flow measurements in various heat transfer studies and is an indispensable device for *in situ* heat flow measurements through walls and roofs of built-up houses. It can be used for the measurement of thermal conductivity of various materials and for measurements of heat flow in various aerodynamic and engineering problems.

With this need in view, a heat flow transducer has been developed by the Central Building Research Institute (CBRI), Roorkee. The transducer consists of a silver constantan thermopile surrounded by a guarding and finally protected by bakelite cover plates fixed over it by araldite adhesive.

Heat flow transducers are used in research institutes for study of heat flow problems. At CBRI alone more than 200 pieces are under use.

A large number of heat flow transducers fabricated have been put to trial at CBRI. They have given very satisfactory results.

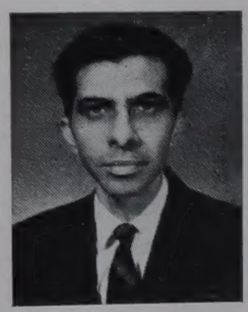
Hylam shed, araldite and constantan wire are the main items required for the fabrication of the transducer. Of these, constantan wire is an imported item.

As it is a small item, not much working capital is required. The cost of production has been worked out at Rs 40/unit.

Parties interested in undertaking the commercial development of these are invited to correspond with the Secretary, National Research Development Corporation of India, Mandi House, Lytton Road, New Delhi 1.

### Prof. E. H. Daruwalla

Prof. E. H. Daruwalla, Professor of Textile Chemistry, Department of Chemical Technology, University of Bombay took over as Director, Bombay Textile Research Association, Bombay on 1 Nov. 1969.



Born in Bombay in 1923, he obtained his B.Sc. degree in 1944 from the University of Bombay. He joined the Department of Chemical Technology of the university and took his B.Sc. (Tech.) and M.Sc. (Tech.) degrees in 1946 and 1948 respectively. Proceeding to UK for higher studies in 1949 he took Ph.D. from the University of Manchester in 1952. He was elected Fellow of the Royal Institute of Chemistry, England in 1960. From 1953 to 1960 he was Reader in Technology of Dyeing and Printing at the University of Bombay; he became Professor of Textile Chemistry in 1960.

Prof. Daruwalla was visiting scientist at the Institute of Physical Chemistry, University of Upsala,

Sweden in 1958. He delivered a series of lectures at the Institute for Textile and Light Industry, Leningrad, and the Textile Institute, Moscow in 1968. As visiting lecturer at the National Research Centre, Cairo in 1968 he delivered a series of lectures and drew up a programme of research in textile chemistry for the Centre. Prof. Daruwalla was the principal investigator of two research projects sponsored by the US Department of Agriculture on 'Photochemistry of cotton' and 'Chemically modified cottons'. He attended the fifth Cotton Utilization Conference (1965, New Orleans) and the first International Conference on Cotton Research (1969, Paris) and presented papers at both these conferences.

Prof. Daruwalla has done considerable work on the fine structure of textile fibres with special reference to cellulose, physical chemistry of dyeing, photochemistry of dyes and polymers, and wet processing of textiles. He has published over 40 research papers. He is a member of the advisory board of the journal, *Cellulose Chemistry and Technology*, published by the Academy of Sciences, Rumania.

## CSIR Silver Jubilee Awards

In commemoration of its silver jubilee celebrated in 1968, the Council of Scientific & Industrial Research proposes to make silver jubilee awards to meritorious Indian scientists for creative work for a certain period of time. The grant will be up to Rs 1.0-1.5 lakhs per annum to an individual for a period of 3 to 5 years depending on the nature of the research work or project to be undertaken. The award and assessment of the work done under the scheme will be made by an expert committee.

Heads of university departments and research institutes may suggest names of suitable active scientists. Individual scientists may also submit proposals outlining the research work or project proposed to be undertaken under the scheme.

The terms and conditions of these awards may be had from the Secretary, Council of Scientific & Industrial Research, Rafi Marg, New Delhi 1.

# PATENTS

### FILED

124082: A new process for the preparation of attars and perfumed oils from flowers, L. B. Singh & M. L. Sharma—NBG, Lucknow.

124214: Improvements in or relating to the electrolytic preparation of sodium chloride liquor of higher concentration, H. V. K. Udupa, K. C. Narasimham & N. S. Thiagarajan—CECRI, Karaikudi.

124215: Improvements in or relating to electrolytic preparation of lead dioxide electrodes for electrolysis, H. V. K. Udupa, K. C. Narasimham & K. S. A. Gnanasekaran—CECRI, Karaikudi.

124367: A process for treating textile materials to impart high abrasion resistance, tear strength and retained breaking strength, V. B. Chipalkatti, N. B. Sattur & I. Hussain—SRIFIR, Delhi.

124383: A new reducing agent, dialdehyde starch for dyeing textile materials with vat dyes, H. V. K. Udupa, M. S. Venkatachalapathy & S. Chidambaram—CECRI, Karaikudi.

124509: Production of oxalic acid from sawdust, S. B. Chaudhuri, M. Chakravarty & M. S. Iyengar—RRL, Jorhat.

124510: Improvements in or relating to the production of catalysts for the preparation of long chain fatty alcohols from fatty oils by continuous hydrogenolysis process, K. V. Raghavan, A. J. Pantulu, K. Seshacharpulu & K. T. Achaya—RRL, Hyderabad.

125358: Preparation of cellulose acetate, semipermeable flat or tubular, osmotic membrane to separate water and other solvents from solution, M. V. Chandorikar, D. J. Mehta & A. S. Kane—CSMCRI, Bhavnagar.

### ACCEPTED

114169: Improvements in or relating to air depolarized cells, A. K. A. Waheed, C. Chakkaravarthy & K. S. G. Doss—CECRI, Karaikudi.

114277: A process for the recovery and purification of napthalene from impure grades of naphthalene including crude naphthalene oil, C. S. B. Nair, D. K. Sen, A. N. Basu & A. Lahiri—CFRI, Dhanbad.

114299: A process for the recovery and purification of anthracene and recovery of carbazole, phenanthrene and allied chemicals from coal tar fractions as a concentrate, C. S. B. Nair, D. K. Sen, A. N. Basu & A. Lahiri—CFRI, Dhanbad.

114363: Improvements in or relating to thermostatic shaking baths, G. C. G. Reddy & G. S. Chowdhury—RRL, Hyderabad.

114418: Improvements in or relating to the direct deposition of platinum over titanium and titanium-based alloys, K. S. G. Doss, S. Sampath & K. S. S. Indira—CECRI, Karaikudi.

114419: A process for the synthesis of epoxidized derivatives of acetylated pentaerythritol diricinoleates as plasticizers for polyvinyl chloride resins, R. K. Bhatnagar & A. K. Jain—SRIFIR, Delhi.


## FORM IV

*(See Rule 8)*

*Statement about ownership and other particulars as required by clause 19-D of the Press and Registration of Books Act*

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| 1 | Place of publication: | New Delhi |
| 2 | Periodicity of its publication: | Fortnightly (24 issues yearly) |
| 3 | Printer's name, nationality and address: | A. Krishnamurthi, Indian, Publications & Information Directorate, Hillside Road, New Delhi |
| 4 | Publisher's name, nationality and address: | Same as (3) above |
| 5 | Editor's name, nationality and address | Same as (3) above |
| 6 | Names and addresses of individuals who own the newspaper and partners or shareholders holding more than one per cent of the total capital | — |

I, A. Krishnamurthi, hereby declare that the particulars given above are true to the best of my knowledge and belief.

15 March 1970

A. Krishnamurthi
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